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The Influence of Induced Value on Perceived Heaviness of Weights

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THE INFLUENCE OF INDUCED VALUE ON PERCEIVED HEAVINESS OF WEIGHTS

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ABSTRACT

To determine whether there is a functional relationship between the value of a distal stimulus and its perceived heaviness, subjects were required to make heaviness judgments of hidden objects previously designated as high, neutral, and low in value. It was hypothesized that heaviness would be accentuated in high value condition, underestimated in the low value condition, and relatively more accurately judged in the neutral condition. None of the predictions was confirmed. Inspection of the data revealed wide individual differences in the set introduced by the experimental inductions. In retrospect the result can be also seen as consistent with Bruner and Postman's (1968) argument that size accentuation is a function not so much of positive value as of degree of personal relevance.

THE INFLUENCE OF INDUCED VALUE ON PERCEIVED HEAVINESS OF WEIGHTS

INTRODUCTION

According to Aristotle's dynamic theory of mind, veridicality of perception depends upon the current state of mind, which has been molded by previous experiences (Wheelwright, 1951). The resulting percept is attained through active synthesis of the distal object's properties. A particular object, then, is neither beautiful nor ugly, but has the potential to be either. This synthesis is similar to the process implied by what Helson (1948) has called the adaptation level, in the first quantitative theory of frame of reference. Bruner and Postman (1968) equate adaptation level to the organism's expectancies about the environments, based on past experience. As illustrated by Bruner (1957), much of this experience takes the form of categorization, the prerequisite for perceptual accessibility. Stimulus input is referred to a class of things or events, thus coding the stimuli in terms of categories. This assignment of stimuli to category membership is made on the basis of a learned hierarchy, itself due to probabilistic expectancies and sets induced by needs. The more primary in the hierarchy the class of events is, the more accessible it is to that category.

Bruner and Postman (1968) argue that the degree of "incongruity" with the prevailing state of organism affects the way assimilation, compromise, and distortion occur. In their recognition experiment with playing cards having unusual color, form-bound subjects tended to assimilate color to a dominant form. Those subjects in whom color dominated, assimilated the form to the color. Finally, when the subject's awareness was placed in between, the color and form were forced to compromise, producing, for example, the percept "greyish four spades."

An important aspect of the perceiver's prevailing state is his motivation. Such motivation involves physiological states, social needs such as need for achievement, and unconscious processes such as impulses. In dynamic or "functional" perceptional theories, perception is regarded as being regulated in part by these motives of the perceiver. This is in contrast to the "formal" approach, where analysis deals with autochthonous variables, and where stimulus meanings, as well as motivations, are considered irrelevant contaminants to be minimized. Traditional psychophysics, beginning with Fechner and his successors, exemplifies this approach. Although Gestaltists like Wertheimer included in perception the contemporary figural status of the stimuli, grouped in a certain manner (e.g., the law of Prägnanz), they also minimized the role of motivation. All of these theoriests follow the Platonic tenet that stimuli "exist," and need only be perceived.

Perhaps in contrast to Platonic theory of "being," Aristotelian theory of "becoming," may better characterize the other major perceptual tradition -- the functionalistic view. functionalists consider behavioral variables that influence perception and give legitimacy to a variety of central conditions of organism, such as motivation, learning, and dispositional factors. Stimulated by the New Look Movement, a variety of ingenious experiments were performed with different theoretical orientations to assess the role of motivation in perception. Findings from these studies challenged traditional psychophysical methods, and brought to light a number of new dimensions.

Allport (1955) reviewed these experiments of the functional theorists, grouping the studies into six broad categories by source of motivational influence. They are bodily needs (Levin, Chein, and Murphy, 1942), reward-punishment (Schafer and Murphy, 1943), personal value (Postman, Bruner, and McGinnies, 1948), value of object (Bruner and Goodman, 1947), perceiver's personality (Cattell and Wenig, 1952), and perceptual defense (McGinnies, 1949). The central feature of these experiments is an interaction between the distal stimuli and the cognitive or motivational sets of the organism. Functional theorists assume that these sets can be induced by environmental stimuli, as well as by procedures and instructions. The value of the distal object may thus be created by set-inducing procedures external to the object. Its value may increase or decrease, for example, through reinforcement and extinction.

In this realm of functional object perception, the value-weight illusion stands as an example of the interaction between the physical properties of the stimulus and the expectancies of the perceiver. In addition to its theoretical importance, the value-weight illusion illustrates some of the confusion present in both popular wisdom and experimental literature regarding the exact nature of this interaction. We often hear anglers boasting about the size of "the fish that just got away." Here ongoing mental activities are manifest in the exaggerated volume of the fish that was missed. But, because size and weight are usually confounded, it is impossible to know whether this is best called a value-size or value-weight problem. In a similar way size and appearance often are the cause of error in weighing. Such confounding is so pervasive that even postmen and butchers, presumably being familiar with weighing, are affected by size-weight illusion (Fries and Holmberg, 1968). Ross (1969) suggested that size-weight illusion can be reduced by intensive practice, but the improvement is often temporary. Bruner and Postman (1948) explain the size-weight relation by way of "symbolic value." By symbolic value they mean the capacity of an object to evoke reactions relevant not primarily to itself but to some state of affairs that it represents.

Even with size controlled there is some reason to believe in a relationship between the value and weight of an object in our culture. With some exceptions, it could be said that the heavier things are the more valuable they are, regardless of size. The notion of this value-weight association is also found in our abstract level of thinking -- the "weighty" responsibilities of the Presidency; the current slang that describes outstanding rock musicians as "heavy." A major purpose of the present experiment is to assess the validity of these common notions by measuring the value-weight relation independent of size. Specific hypotheses will be proposed following a review of the size-value and weight-value literature.

Problem

The clasical Bruner and Goodman (1947) experiment of object value needs further clarification. The first task of this experiment dealt with imagery. Both poor and rich children were asked to adjust an iris diaphragm to match the sizes of a penny, a nickel, a quarter, and half dollar without any coins present. The second task was to make similar measurements with coins present for an experimental group, and with cardboard discs for the control group. The results of the judgment with coin present indicated (a) as compared with the control Ss, the experimental Ss overestimated the size of the coins, (b) the poor children overestimated the size of the coins more than rich children, and (c) this latter overestimation was more pronounced the higher the coin denominations, except for the half dollar.

Attempts at replication of the Bruner and Goodman experiment, however, have raised some questions about their results. Carter and Schooler (1945) followed the original design and failed to obtain a significant difference between rich and poor children with coins present. With the coin absent, poor children significantly overestimated only with respect to the quarter and half dollar. These results, of course, contrary to the Bruner and Goodman findings, but there are other experiments supporting the original.

Ashley, Harper, and Runyon (1951) argued that the Bruner and Goodman study might have been mediated by subjects' lack of familiarity with currency of higher denominations, rather than by motivational variables. So they, after making other things constant, manipulated need within the same subject. Under hypnotically induced rich and poor states, subjects judged four identical metal slugs, but given different names -- lead, silver, white gold, and platinum. The results showed that the subjects overestimated size as the ostensible value increased, and that this tendency was more pronounced under poor status than under rich status.

Lambert, Solomon, and Watson (1949) also tested the Bruner and Goodman hypothesis. Originally neutral poker chips were made valuable by a procedure in which an experimental group of children received candy in exchange for a poker chip.

The control group, on the other hand, received candy directly without poker chips. Size judgments were made both before and after this value-inducing procedure. Moreover, another size judgment was made after the reinforcement of candy was withheld. The results showed that the experimental group first significantly overestimated the size of the token and then returned to the pre-experimental level when the value of the poker chip was extinguished.

In general, Bruner and Goodman hypothesis that the perceived size of a valued object is greater than that of a neutral object of equal physical size, seems to have been supported. However, Dember (1960) reviewed this series of experiments and suggested the possibility that the size-value relation might be mediated by culturally learned associations rather than by motivation. Similarly, the obtained relation might be nothing more than response bias, especially since the subject can readily guess the objective of the experimental instructions (Orne, 1962; Rosenthal, 1966).

Experiments in the functional tradition with lifted weights are not as frequent as studies with the visual modality, although the history of this research area is also long. Major studies in the area are the clasical experiment by Harper and Stevens of half-as-heavy judgments (1948), and Helson's (1948) theory of adaptation level. The latter report describes many phenomena that have now been demonstrated, such as contrast effect (Helson, 1948), context effect (Anderson, 1971), time-order effect (Woodrow, 1933; Anderson and Jacobson, 1968, recency effect (Anderson and Jacobson, 1968), and others.

Recent research seems to concentrate on the problem of density. Many of these studies of the density variable support Dember's conviction that culturally acquired associations, rather than motivation, are the source of error in functional experiments. In one of these studies Harper and Stevens (1948) found that subjective size of jnds for lifted weights was not an equal interval; apparent weight increased more rapidly than physical weight. The task of this experiment required the subjects to select an object which felt half-as-heavy as the standard weight. Ross (1969), however, argued that Harper and Stevens did not keep the density of the objects constant, and that this problem could have changed expectancy about weight.

Sjöberg (1969) studied magnitude estmation of cylindric weights with fixed diameter but varying independently in weight and height (hence in density). He also obtained non-linear judgments of heaviness; that is, apparent weight was a positively accelerated function of weight, while a negatively accelerated function of size. He proposed a simple equation to describe perceived weight as directly proportional to a sensation of weight and inversely proportional to a sensation of size. Although this description avoided the term "density" and appealed to the generality and usefulness of the classical heaviness scale, the equation is nothing more than a density model. Donovan and Ross (1969) reported that with heavier weights, density played an increasingly important role in judgment of heaviness. These findings are in accordance with Ross and Di Lollo's (1970) findings that varying density alone yielded relatively greater illusion of weight in the range of 700 - 900 gm than the range of 100 - 300 gm. In the latter experiment, the stimuli were 2 inch aluminum tubing keeping weight, height, and density, respectively constant, in three series of 5 weights (for both heavy and light ranges of weight). The standard weights were the middle stimuli of each series and were the same in weight, height, and density throughout series within the heavy and light range categories respectively. The subjects were to compare the standard with the difference of all pairs of the stimuli by a rating scale with the standard being called 100. The results indicated that the interaction between series, especially between weight-constant and density-constant was greater in the heavy range category.

Ross (1969) suggested that there is an optimal density of the object to be judged. She constructed four constant volumes (4005, 1780, 800, and 550 cm^3) out of polystyrene block and varied the weights of each volume by 3 g intervals from 112 - 130 g, and by 5 g intervals from 92 - 112 g and from 130 - 165 g. The variation in weight was made by inserting lead shot; the hidden standard weighed 120 g. The subject's task was to lift the hidden standard and the visible weight (by attached strings) alternatively with the same hand, and to state when the visible weight was equal to the hidden standard. She expected that, since the visible weight varied in weight but not in size within four respective categories of volume, the density-weight illusion might affect in the way the subject compared the weights to a common standard throughout categories of volume. As she expected, her subjects could approximate the judgment of subjective equality better in a certain volume category than in other volume categories. With accuracy as the criterion, the optimal density for polystyrene was $0.140 g/cm^3$. Similar findings were obtained in two experiments with tins of two different weights, and Ross then concluded that weight illusions were mediated by all expected sensory inputs such as material and density as well as size. Unfortunately, her subjects made no recorded judgments regarding the density of the unseen standard.

Harshfield and De Hardt (1970) reported a density-weight illusion study which further demonstrated the importance of expectancy. Five cubes of equal size and weight, made of balsawood, mahogany, aluminum, brass, and steel, were ranked from heaviest to lightest in that order by subjects who lifted them by thumb and index finger wearing rubber finger gloves. Other subjects who ranked the cubes by only visual cue arranged them in the reversed order. (The cubes were either hollowed out or provided with heavier stuffing to make the same weight.)

We have so far seen that even the primary psychophysical responses to stimuli can be changed by such non-stimulus factors as expectancy and motivation. This experiment will attempt to determine whether there is a consistent relation between the value of a distal stimulus and its perceived heaviness. Previous research has too often confounded the value-weight relation with size and density -- factors that have also been shown to influence perceived weight.

To avoid this confounding, subjects will be required to make heaviness judgments of hidden objects that have previously been designated as high or low in value. A control condition will be included, in which the heaviness judgments will be made in the absence of any value-designating instructions. The results of this experiment should demonstrate whether there is a consistent relation between value and heaviness, as independent of object size and density. It is hypothesized that heaviness will be accentuated in the high value condition, while being underestimated in the low value condition. Relatively more accurate judgments should be made in the no instructions condition.

METHOD

Subjects

Thirty male undergraduate students enrolled in introductory psychology courses at William and Mary served as Ss. The first 21 Ss were volunteers and the remaining 9 Ss were solicited by E in a none-systematic fashion from the same population. All Ss were paid $1.60 for participation in this experiment. Ss were randomly assigned to six experimental conditions as they were recruited.

Apparatus

The apparatus was designed to permit the S to lift an entirely hidden standard and comparison weight by pulling a string attached to each weight. To accomplish this, a 36" x 18" x 19" wooden box with an open side facing the experimenter was installed upon a 24"-high bench. A lengthwise beam was installed 17" above the top of the box. A pulley was mounted on this beam over each of the two threading holes (respectively labelled "Standard" and "Comparison") leading to the weights. A second set of two pulleys was attached to the top of the box near the S. The resulting N-shaped string arrangement enabled Ss to pull the weights by an upward motion without sensing sway or jolting in the weights. Plastic rings of 1" diameter were attached to the ends of the strings.

S sat in an arm chair elevated by a platform so that the height of the table exceeded the top of the box by 5 inches.

In this position the S's forearm rested on the chair arm when his finger reached the plastic ring.

All weights actually used were small capped plastic cylinders filled with varying mixtures of sand and lead shot, depending on the weight desired. The standard weight was set at 100 g, and the set of five comparison weights had values of 90 g, 95 g, 100 g, 105 g, and 110 g respectively (all accurate to ±.01 gram).

As an experimental prop, a large case (22" x 11" x 9") containing three small cases (7½" x 6½" x 6¼") was placed just out of the subject's view. These small cases were identical in outward appearance except that one was labelled as "platinum," one as "laboratory weight," and the third as "reprocessed iron." At the beginning of the experiment these cases were placed beside the E, who sat on a chair on the floor, facing the subject. In the course of the study the E pretended to remove weights for use from each small case in turn, and placing the empty case so that its label was in full view of the subject.

Procedure

Ss were run individually and were assigned to one of six treatment combinations. To assess the effects of presentation order, the three value conditions, High (H), Neutral (N), and Low (L), were combined into these orders: HLN, HNL, NHL, NLH, LHN, and LNH. General instructions to all subjects were administered orally and were also typed on a sheet of paper taped to the arm of the chair. These instructions appear in Appendix 1.

Experimental instructions designed to convey the value-related information were also typed on 5" x 8" cards presented singly to each S in an order determined by his treatment combination. The low-value instructions informed the subject that: "For this series of judgments, the Comparison weights are made from reprocessed scrap iron." In contrast, the neutral-value instructions read as follows: "O.K. that ends the first series of judgments. For the next series, we will use a different set of Comparison weights made of a metal commonly used in laboratory weights." Finally, the high-value instructions stated that: "O.K. that ends the second series of judgments. For the final series, we will use a third set of Comparison weights made of platinum, a semi-precious and rare metal of substantial monetary value."

As each subject arrived at the experimental room, he was guided to the chair on the platform to be seated and was asked to read carefully the written general instructions on the arm of his chair. After answering any questions raised by S, E presented the first value-treatment card. After the subject understood what kind of objects he was going to lift as comparison weights, the E obtained the properly labelled small case, pretended to remove weights from inside it, and casually placed the empty case on top of the large box where the S could see it.

S was told that on each trial initiated by the E, he was first to pull up the standard weight in a smooth motion, and then do the same with the comparison weight. S's task on each trial was to compare the comparison weight to the standard and to state whether he judged the comparison to be heavier than (h), equal to (e), or lighter than (l) the standard.

The five comparison weights were presented five times in a predetermined sequence (identical across value conditions) for total of 25 judgments by S in each of three value treatments. The presentation sequence appears in Appendix 1.

Between each value treatment, Ss were given a 5 minute break. Upon his return, each S was shown to the next card to be informed of new comparison stimuli.

Following completion of the final judgment series, Ss were asked to complete a form containing word associations designed to discover S's first association to both "platinum" and "reprocessed iron" among other filler items. A second page of the questionnaire asked for the S's prediction of this experimental outcomes in terms of percentage of three response categories (h,e,l). The complete questionnaire appears in Appendix 1.

It took an average of 35 minutes, including two 5-minute recesses for the S to finish the 75 judgments of lifted weights, and 5 minutes more to complete the word associations and predictions. S̲s were then assured that they would be paid, were thanked for their participation, and were excused.

RESULTS

There are two ways to analyze the data from this experiment. First, the treatment effects can be determined without regard to order of presentation. The mean number of heavier, equal, and lighter judgments made by subjects in each first administered value condition are shown in Table 1. These data demonstrated consistent overestimation of "heavy" and underestimation of "light" regardless of the value treatment (X^2=10.67, df = 4, $p<.05$). A similar result was obtained when Kendall's Coefficient of Concordance, w, was computed over all judgment data in all orders of presentation (Table 2). This analysis indicated a high degree of agreement (w = 0.903) among the various value treatment combinations, as did an average rank correlation over all possible pairs of rank order, (r_s = 0.883).

Second, the order effects of presentation can be examined. For this purpose, Ss' mean overestimations of "heavier" and "equal" judgment across all treatment groups classified by order of presentation were considered (Table 3). The analysis of variance of overestimated judgment (Table 4) indicated there were no main effects for either judgment category (heavier, equal) or order of presentation (1st, 2nd, and 3rd). However, there was a significant interaction between the two (F = 4.796, df = 2, $p<.01$). The initial overestimation of "heavier" decreased across presentation order, while the overestimation of "equal" increased over order of presentation.

In the absence of any value treatment effects, an internal analysis was performed to determine whether subjects' perceptions of the value instructions might have influenced the judgments. Ss' word associations to "platinum" were correlated with "heavier" judgment in all High value treatment regardless order of presentation. Since Ss tended to associated the word "platinum" with two classes of words, namely, light weight words and non-light words, the correlations were made between these two groups (Table 5). The average scores were in the expected direction, with the "heavy" judgments were smaller for the light-association category than for the non-light association category, but the results were not significant ($t = 1.57$, $df = 20$, $p < .20$).

DISCUSSION

Unfortunately, the major result to appear in this study was another example of Time Effect (TE) in psychophysics; none of the major predictions was confirmed. Taking the case of the change in negative TE, presumably derived from central fading traces, peripheral readiness, or other reasons, the adaption over time suggests at least that there is an active attitude of observer which adapts to the sensory stimuli. Beside mechanistic interpretation by ways of frequency and assimilation, Ss appeared to become adjusted to the rather narrow range of weights used and modified the range of their categorizations as the experiment progressed.

Inspection of the data revealed wide individual differences in the set introduced by the experimental instructions. As the word associations indicate, Ss vary in their ideas about the primary attribute of the stimulus objects -- particularly in the high-value condition. One S thinks that platinum is light, another S thinks that it is dense, and still the third thinks it is precious. Somewhat similar contradictory responses on the part of S's word associations were found for "reprocessed iron." Natadze (1960) reports that there are two possible types of the effects of set upon the subjects perception of the stimulus; a contrastive effect in which S would feel his perception contrary to the set induction and as assimilative effect which S would tend to accentuate the magnitude of an attribute in the direction of set-induction. Although Natadze suggests that such a fixated set (developed on the basis of imagination) generally manifests itself in a relatively fainter manner, and is of a considerably less stable nature than are sets developed on the basis of direct perception, the present results demonstrate that these individual sets cannot be ignored.

Owing a number of factors, especially the critical fact that S has no opportunity to see the object, this experiment did not show value-related accentuation of magnitude with lifted weight of the hidden objects. In retrospect this can be seen as consistent with Bruner and Postman's (1968) argument that size accentuation is a function not so much of positive value as of degree of personal relevance, and the lack of direct experience with the weights would almost certainly decrease this relevance.

TABLE 1

MEAN NUMBER OF HEAVIER, EQUAL, AND LIGHTER JUDGMENTS BY CONDITIONS IN FIRST TREATMENT ADMINISTERED

Treatment Given First	Heavier	Equal	Lighter
High Value (n=10)	13.0	6.8	5.2
Neutral Value (n=10)	12.9	6.8	5.3
Low Value (n=10)	13.0	6.4	5.6

TABLE 2

RANK SCORES WITHIN TREATMENT GROUPS SHOWING RELATIVE PROPORTIONS OF ALL JUDGMENTS IN ALL ORDERS OF PRESENTATION[a]

Order of Combinations	First Presentation			Second Presentation			Third Presentation		
	heavy	equal	light	heavy	equal	light	heavy	equal	light
HLN	9	2	4	8	5	2	7	6	2
HNL	9	4	1	8	5	2	7	6	3
NHL	9	4	1	7	6	3	8	5	2
NLH	9	4	3	8	5	2	7	6	1
LHN	9	4	1	8	5	3	7	6	2
LNH	8	2	5	9	4	1	7	6	3
Average	8.8	3.3	2.5	8.0	5.0	2.2	7.2	5.8	2.2

[a]The greater the numerical rank, the more frequently that judgment category was utilized.

TABLE 3

MEAN OVERESTIMATION OF "HEAVIER" AND "EQUAL" JUDGMENTS ACROSS ALL THREATMENT GROUPS CLASSIFIED BY ORDER OF PRESENTATION[a]

Judgment	Presentation		
	First	Second	Third
Heavy	3.0	2.2	1.2
Equal	1.7	2.7	3.5

[a]Scores are mean differences between the frequency a category was mentioned and the frequency it actually appeared.

[b]It should be noted that the sum of the "heavier" and "equal" category overestimations is nearly identical across the three presentation orders. In each case, of course, this sum corresponds to the underestimation in the "lighter" judgment category.

TABLE 4

ANALYSIS OF VARIANCE OF OVERESTIMATED JUDGMENT

Source	df	MS	F
Blocks	29	11.009	1.066
Judgment (Heavier & Equal)	1	11.755	1.139
Order of Presentation (1st, 2nd, 3rd)	2	.173	.017
Judgment x Order of Presentation	2	49.505	4.796*
Residual	145	10.323	

* $p<.01$

TABLE 5

PROPORTIONS OF "HEAVIER" JUDGMENTS IN HIGH VALUE CONDITION

CLASSIFIED ACCORDING TO WORD ASSOCIATIONS

Group of Light weight Word Association			Group of Non-light weight Word Association		
Subject	Words Associated w/platinum	Proportion of Heavier judgment in High value	Subject	Words Associated w/platinum	Proportion of Heavier judgment in High value
25	ring	.72	9	heavy	.36
15	jewelry	.40	17	gold	.68
27	precious	.80	21	silver	.52
20	light	.32	11	gold	.16
29	ring	.68	13	-plus	.56
19	plated	.44	24	gold	.80
14	jewelry	.32	19	equal	.52
10	blonde	.56	23	equal to standard	.48
16	shine	.52	30	silver	.32
			26	dense	.64
			18	money	.12
			22	silver	.44
			28	gold	.36

APPENDIX 1

APPENDIX 1

GENERAL INSTRUCTIONS GIVEN TO Ss

This is a psychophysical experiment designed to determine difference thresholds for lifted weights of various materials. The procedure will be based on the psychophysical method known as the Method of Constant Stimuli, with lifted weights has at times been confounded by the fact that subjects could see -- as well as feel -- the weights that were being judged. To avoid this possible confounding, you will at no time during the experiment be permitted to view the weights being lifted, though I will tell you what material they are made of.

All the weights will be suspended on these threads within this box. The weight on the left is the standard, against which all the remaining weights are to be judged. The weight on the right -- called the comparison -- will be changed by me from trial to trial. Your task is to pull the threads up for a few inches' distances one at a time, first the Standard and then the Comparison, by a smooth motion of your preferred forearm while your elbow is rested upon the chair. Place your index finger through the ring at the end of the thread, then pull the thread with a smooth motion of your forearm. You may perceive the Comparison as sometimes heavier than the Standard, sometimes lighter than the Standard, and sometimes equal to the Standard. You should select one of these three categories -- heavier, lighter, or equal -- to report each judgment. If you think the Comparison is lighter than the Standard, say "lighter"; if you think the Comparison is heavier than the Standard, say "heavier". In this series you will be asked to made 25 such judgments. Do you have any questions before we begin?

APPENDIX 1 (cont'd)

WORD ASSOCIATION BLANK ADMINISTERED TO S

AT THE END OF EXPERIMENTAL SESSION

For each of the following metals, please write down the word or phrase that first comes to your mind. This test of association has no right or wrong answers -- please just write the first word you think of in association with each metal.

Platinum	________________
Copper	________________
Tin	________________
Reprocessed Iron	________________
Brass	________________
Lead	________________
Aluminum	________________
Gold	________________
Zinc	________________
Uranium	________________

APPENDIX 1 (cont'd)

S' PREDICTION BLANK ADMINISTERED TO S AT THE END OF EXPERIMENTAL SESSION

Finally, we'd like you to predict what you think the results of this experiment will be. We are interested in the proportion of times that each of three different metals is judged heavier, lighter, or equal to the standard weight. In the boxes below, for each of our three metals, please enter the percentage of the time you think the weights made of that metal will end up being heavier, lighter, or equal to the standard.

	% Heavier	% Equal	% Lighter
Reprocessed Iron	________	________	________
Laboratory Weights	________	________	________
Platinum	________	________	________

APPENDIX 2

APPENDIX 2

RAW JUDGMENT PROPORTIONS FOR ALL SUBJECTS WITHIN

HLN VALUE TREATMENT COMBINATION

Order of Presentation	1st Presentation High Value			2nd Presentation Low Value			3rd Presentation Neutral Value		
Judgment	Heavier	Equal	Lighter	Heavier	Equal	Lighter	Heavier	Equal	Lighter
Subject 1	.36	.32	.32	.36	.28	.36	.40	.40	.20
3	.36	.28	.36	.36	.48	.16	.32	.40	.28
5	.52	.28	.20	.44	.36	.20	.52	.28	.20
7	.48	.20	.32	.44	.24	.32	.36	.20	.44
25	.72	.16	.12	.60	.20	.20	.48	.40	.12
Average (n = 5)	.488	.248	.264	.440	.312	.248	.416	.336	.248

APPENDIX 2 (cont'd)

RAW JUDGMENT PROPORTIONS FOR ALL SUBJECTS WITHIN

HNL VALUE TREATMENT COMBINATION

Order of Presentation	1st Presentation High Value			2nd Presentation Neutral Value			3rd Presentation Low Value		
Judgment	Heavier	Equal	Lighter	Heavier	Equal	Lighter	Heavier	Equal	Lighter
Subject 9	.36	.32	.32	.36	.40	.24	.24	.40	.36
15	.40	.44	.16	.44	.44	.12	.52	.44	.04
17	.68	.28	.04	.64	.28	.08	.52	.36	.12
21	.52	.28	.20	.56	.16	.28	.52	.20	.28
27	.80	.16	.04	.64	.28	.08	.48	.32	.20
Average (n = 5)	.552	.296	.152	.528	.312	.160	.456	.344	.200

APPENDIX 2 (cont'd)

RAW JUDGMENT PROPORTIONS FOR ALL SUBJECTS WITHIN

NHL VALUE TREATMENT COMBINATION

Order of Presentation	1st Presentation Neutral Value			2nd Presentation High Value			3rd Presentation Low Value		
Judgment	Heavier	Equal	Lighter	Heavier	Equal	Lighter	Heavier	Equal	Lighter
Subject 11	.44	.44	.12	.16	.56	.28	.44	.44	.12
13	.56	.32	.12	.56	.28	.16	.40	.32	.28
20	.44	.28	.28	.32	.36	.32	.40	.32	.28
24	.92	.08	.00	.80	.16	.04	.64	.20	.16
29	.60	.16	.24	.68	.12	.20	.76	.12	.12
Average (n = 5)	.592	.256	.152	.504	.296	.200	.528	.280	.192

APPENDIX 2 (cont'd)

RAW JUDGMENT PROPORTIONS FOR ALL SUBJECTS WITHIN

NLH VALUE TREATMENT COMBINATION

Order of Presentation	1st Presentation Neutral Value			2nd Presentation Low Value			3rd Presentation High Value		
Judgment	Heavier	Equal	Lighter	Heavier	Equal	Lighter	Heavier	Equal	Lighter
Subject 12	.32	.16	.52	.36	.12	.52	.44	.08	.48
14	.52	.40	.08	.40	.52	.08	.32	.56	.12
19	.64	.24	.12	.52	.36	.12	.52	.40	.08
23	.40	.28	.32	.48	.20	.32	.48	.24	.28
30	.32	.36	.32	.36	.40	.24	.32	.52	.16
Average (n = 5)	.440	.288	.272	.424	.320	.256	.416	.360	.224

APPENDIX 2 (cont'd)

RAW JUDGMENT PROPORTIONS FOR ALL SUBJECTS WITHIN

LHN VALUE TREATMENT COMBINATION

Order of Presentation	1st Presentation Low Value			2nd Presentation High Value			3rd Presentation Neutral Value		
Judgment	Heavier	Equal	Lighter	Heavier	Equal	Lighter	Heavier	Equal	Lighter
Subject 2	.60	.28	.12	.32	.40	.28	.32	.44	.24
4	.68	.24	.08	.52	.40	.08	.64	.32	.04
6	.44	.28	.28	.44	.36	.20	.32	.44	.24
8	.60	.32	.08	.56	.32	.12	.52	.32	.16
26	.56	.36	.08	.64	.16	.20	.52	.36	.12
Average (n = 5)	.576	.296	.128	.496	.328	.176	.464	.376	.160

APPENDIX 2 (cont'd)

RAW JUDGMENT PROPORTIONS FOR ALL SUBJECTS WITHIN

LNH VALUE TREATMENT COMBINATION

Order of Presentation	1st Presentation Low Value			2nd Presentation Neutral Value			3rd Presentation High Value		
Judgment	Heavier	Equal	Lighter	Heavier	Equal	Lighter	Heavier	Equal	Lighter
Subject 10	.52	.12	.36	.52	.32	.16	.56	.32	.12
16	.44	.32	.24	.52	.28	.20	.52	.24	.24
18	.20	.24	.56	.28	.32	.40	.12	.60	.28
22	.72	.20	.08	.80	.16	.04	.44	.40	.16
28	.44	.20	.36	.52	.28	.20	.36	.16	.48
Average (n = 5)	.464	.216	.320	.528	.272	.200	.400	.344	.256

APPENDIX 2 (cont'd)

PREDICTED JUDGMENT PROPORTIONS AND WORD ASSOCIATIONS

FOR ALL SUBJECTS IN HLN VALUE TREATMENT COMBINATION

Order of Presentation	S' Predictions									Word Associations with	
	High Value			Low Value			Neutral Value				
Judgment	Heavier	Equal	Lighter	Heavier	Equal	Lighter	Heavier	Equal	Lighter	Platinum	Reprocessed iron
Subject											
1											
3											
5											
7											
25	.60	.30	.10	.40	.30	.30	.25	.40	.35	ring	scrap
Average	.60	.30	.10	.40	.30	.30	.25	.40	.35		

APPENDIX 2 (con't)

PREDICTED JUDGMENT PROPORTIONS AND WORD ASSOCIATIONS

FOR ALL SUBJECTS IN HNL VALUE TREATMENT COMBINATION

Order of Presentation	S' Predictions									Word Associations	
	High Value			Neutral Value			Low Value			with	
Judgment	Heavier	Equal	Lighter	Heavier	Equal	Lighter	Heavier	Equal	Lighter	Platinum	Reprocessed iron
Subject 9	.20	.30	.50	.35	.30	.35	.30	.10	.60	heavy	heavy
15	.60	.20	.20	.25	.50	.25	.60	.30	.10	jewelry	junk
17	(.75)	(.20)	(.05)	.70	.20	.10	.70	.20	.10	gold	cars
21	.40	.10	.10	.45	.10	.45	.50	.20	.30	silver	scrap
27	.85	.13	.02	.33	.34	.33	.40	.50	.10	precious	pig
Average	(.560)	(.186)	(.214)	.416	.288	.296	.500	.260	.240		

APPENDIX 2 (cont'd)

PREDICTED JUDGMENT PROPORTIONS AND WORD ASSOCIATIONS

FOR ALL SUBJECTS IN NHL VALUE TREATMENT COMBINATION

Order of Presentation	S' Predictions									Word Associations with	
	Neutral Value			High Value			Low Value				
Judgment	Heavier	Equal	Lighter	Heavier	Equal	Lighter	Heavier	Equal	Lighter	Platinum	Reprocessed iron
Subject 11	.25	.50	.25	.25	.30	.45	.70	.25	.05	gold	scrap
13	.25	.50	.25	.30	.30	.40	.60	.30	.10	-plus	-scrap
20	.35	.30	.35	.30	.30	.40	.40	.25	.35	light	chain
24	.60	.10	.30	.50	.05	.45	.70	.10	.20	gold	scrap
29	.40	.15	.45	.50	.10	.40	.65	.05	.30	ring	conservation
Average	.37	.31	.32	.37	.21	.42	.61	.19	.20		

APPENDIX 2 (cont'd)

PREDICTED JUDGMENT PROPORTIONS AND WORD ASSOCIATIONS

FOR ALL SUBJECTS IN NLH VALUE TREATMENT COMBINATION

Order of Presentation	S' Predictions									Word Associations With	
	Neutral Value			Low Value			High Value				
Judgment	Heavier	Equal	Lighter	Heavier	Equal	Lighter	Heavier	Equal	Lighter	Platinum	Reprocess-ed iron
Subject 12	.35	.50	.15	.45	.50	.05	.40	.55	.05	plated	iron ore
14	.35	.50	.15	.40	.50	.10	.25	.60	.15	jewelry	junk yard
19	.60	.30	.10	.55	.25	.20	.40	.35	.25	equal	heavy
23	.30	.40	.30	.30	.30	.40	.20	.70	.10	equal to standard silver	light
30	.25	.50	.25	.50	.20	.30	.10	.60	.30		junk car
Average	.37	.44	.19	.44	.35	.21	.27	.56	.17		

APPENDIX 2 (cont'd)

PREDICTED JUDGMENT PROPORTIONS AND WORD ASSOCIATIONS

FOR ALL SUBJECTS IN LHN VALUE TREATMENT COMBINATION

Order of Presentation	S' Predictions									Word Associations with	
	Low Value			High Value			Neutral Value				
Judgment	Heavier	Equal	Lighter	Heavier	Equal	Lighter	Heavier	Equal	Lighter	Platinum	Reprocessed iron
Subject 2											
4											
6											
8											
26	.60	.20	.20	.70	.10	.20	.60	.20	.20	dense	scrap
Average	.60	.20	.20	.70	.10	.20	.60	.20	.20		

APPENDIX 2 (cont'd)

PREDICTED JUDGMENT PROPORTIONS AND WORD ASSOCIATIONS

FOR ALL SUBJECTS IN LNH VALUE TREATMENT COMBINATION

Order of Presentation	S' Predictions									Word Associations with	
	Low Value			Neutral Value			High Value				
Judgment	Heavier	Equal	Lighter	Heavier	Equal	Lighter	Heavier	Equal	Lighter	Platinum	Reprocessed iron
Subject 10	.60	.10	.30	.55	.15	.30	.40	.35	.25	blonde	tank
16	.60	.30	.10	.30	.50	.20	.20	.50	.30	shine	factory
18	(.35)	(.35)	(.20)	.15	.50	.35	.00	.65	.35	money	recycling
22	.20	.50	.30	.40	.50	.10	.60	.30	.10	silver	crane
28	.50	.10	.40	.40	.20	.40	.40	.20	.40	gold	recycle
Average	(.45)	(.27)	(.26)	.36	.37	.27	.32	.40	.28		

APPENDIX 3

APPENDIX 3

METHODOLOGICAL APPENDIX

1. Table 5 shows a vast individual differences both in cognizing a "platinum", which is induced by a value instruction, and in resulting performance of "heavier" judgment. With these internal variations in a given category, any single analysis in the lump would turn out to be insignificant. However, there is evidence from the same data that the value-related instructions did create judgment differences, suggesting that the experiment did not provide a clear test of the original hypothesis.

2. The independence assumption of the Kendall's Coefficient of Concordance (used to analyze the data of Table 2) was violated by ranking data across all the repeated measures. The advantage of a concise summary of the data, showing a systematic pattern consistent across all measurements, was thought to outweigh the disadvantage of violating the independence assumption.

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